

Status and Description of Training

Title: “Using the Software Job Aid to Conduct Software Reviews”

Purpose: This Self-Study Guide accompanes a video training on how to use the Software Review Job Aid (also available on-line). The course trains FAA personnel and industry personnel how to perform software reviews to assess if a software project meets the objectives of RTCA DO-178B.

Status: The Software Review Job Aid was completed June 1998 and training was delivered via Interactive Video Teletraining (IVT) on July 1, 1998. Video copies of the training are attainable for FAA and industry use.

Related Materials: A copy of the Job Aid is available on the “Job Aids” section of the Aircraft Certification Service’s Software Web-Site.

Using the Software Job Aid to Conduct Software Reviews

An Interactive Video Teletraining Course



**Developed and Presented by
Leanna Rierson
Software Program Manager, AIR-130
Aircraft Engineering Division
Aircraft Certification Service
Federal Aviation Administration**

July 1, 1998

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How Do I Use This IVT Guide?

This Interactive Video Teletraining (IVT) Guide provides you with an orientation to the IVT presentation, support materials for use during the broadcast, and the course evaluation.

Follow these steps to complete your study.

1. Read the Software Curriculum Overview. It describes the training events which make up the software curriculum, including this IVT lesson.
2. Review the *IVT Presentation Orientation* before the broadcast, if possible, or before you watch the self-study videotape. It provides the purpose of the presentation, the target audience, information about the instructor, what you will learn, and topics covered.
3. Turn to Appendix A, *IVT Presentation Visuals*, and refer to it during the broadcast/videotape. You can use these visuals to take notes and follow along when viewing the presentation/self-study video.
4. Review the exercises in Appendix B. You will complete these exercises during the IVT lesson or when viewing the self-study video.
5. Complete the *IVT Presentation Evaluation Form* in Appendix C and send it to your Directorate/Division Training Manager (ATM). Your comments are very important to us and will help to enhance the quality of the IVT lesson.

NOTE: The IVT broadcast will be videotaped so that it may be used as a self-study package for those who were unable to participate in the broadcast, or for those who wish to refresh their knowledge of the content presented. This IVT Guide may also be used with the self-study videotape.

Software Training Overview

The software curriculum begins by building a fundamental understanding of software principles (fundamentals), then covers specific job procedures required by the Aviation Safety Engineer (ASE) and Aviation Safety Inspector (ASI) to perform their unique software job functions. It concludes with the application of these procedures to real-world cases (case study). All training will reflect the need for ASE/ASI teaming and early involvement in certification projects. The procedural courses and case study will be developed in FY-99. The Software Fundamentals course delivery began in FY-98. It is described below:

Software Fundamentals Course

- ⇒ **Computer Science Lesson** - Delivery time: 2-3 hrs.
Introduction to basic computer principles and operation. Initially conducted via Interactive Video Teletraining (IVT). Self study package with video developed. Recommended as pre-requisite to the Software Fundamentals classroom course.
- ⇒ **Software Fundamentals Classroom Delivery**
Provides basic knowledge of the system and software lifecycles and the role of the ASE/ASI in its various phases. Delivery Time: 6.5 days.

Relationship of Job Aid to Software Curriculum

The Software Job Aid is a tool to be used by engineers and inspectors who as a team conduct software reviews prior to certification. The Software Grand Design, Aircraft Certification's blueprint for addressing certification software functions, recommended as a priority developing and deploying a guide for those who are **currently** doing software reviews. By following the Job Aid's systematic approach, a standardized method for conducting and documenting software reviews can be accomplished.

With the development of procedural training for engineers and inspectors, this Job Aid will be incorporated into those courses.

What Is IVT?

Interactive Video Teletraining, or IVT, is instruction delivered using some form of live, interactive television. This course originates from the television studio at the FAA Academy in Oklahoma City. Through the IVT broadcast facility, the instructor is able to use a variety of visuals, objects, and media formats to support the instruction.

Participants are located at various receive sites around the country and can see the instructor and his/her materials on television sets in their classrooms. The participants can communicate with the instructor either through a microphone and/or the simple-to-use Viewer Response System keypads. During the live presentation, when a participant has a question or the instructor asks for specific participant responses to questions, the participant(s) can signal to the instructor using the keypad.

The collective participant responses, or the name of a specific participant signaling a question, are immediately visible to the instructor on the console at the broadcast site. The instructor can then respond as needed. When the instructor calls on a specific participant to speak from a site, participants at each of the other sites can simultaneously hear the participant who is speaking.

This guide provides you with a framework for this course as well as the following three appendices to be used during the course:

- Appendix A contains copies of the actual slides used by the instructor during the broadcast. You can use these visuals to follow along with the broadcast or when you watch the tape and to record notes directly on the pages.
- Appendix B contains the Presentation Exercises.
- Appendix C contains the IVT Course Evaluation Form. Please fill out this form after the IVT/self study course is finished and send the form to your Directorate/Division Training Manager (ATM).

Who Is the Target

- Engineers and inspectors who have experience in conducting software reviews

Audience?**Who Is the Instructor?**

Leanna Rierson is the Software Program Manager for the Aircraft Certification Avionics Branch. She has over eight years of experience in numerous computer/aviation industry positions. These positions include: avionics/electrical engineering specialist at the Wichita ACO and software positions with industry at NCR and Cessna Aircraft Company. Leanna graduated summa cum laude from Wichita State University and is currently working on a Master's degree in Software Engineering from Rochester Institute of Technology.

What Will You Learn?

At the end of the training, participants will be able to:

- Describe the Job Aid tasks, processes, and activities
- Explain the four Stages of Involvement
- Identify how to tailor the Job Aid for different projects
- Describe how findings/observation are documented.

What Does the Presentation Cover?

The following outline gives an overview of the course content. In addition, Appendix A, contains all presentation slides.

- Background information and Job Aid layout
- Section I - Introduction
- Section II - Overview of the review process
- Section III - Getting started
- Section IV & V - Review tasks/activities/questions
- Desk-top review considerations
- Tailoring the Job Aid
- Summary

Presentation Visuals

Appendix A

Slide 1

Using the Software Job Aid to Conduct Software Reviews

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Assumptions & Ground Rules

- Target Audience
 - Experienced Software Reviewers
- Video to be Reproduced for FAA and Industry Use
- Do not Use Company Names in Discussions
- Be Positive
- Controversial Topics May be Discussed Off-Line

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Objectives of IVT

- Describe the Tasks, Processes, & Activities Outlined in the Job Aid
- Explain the 4 Stages of Involvement
- Identify How to Tailor the Job Aid for Different Projects
- Describe how Findings/Observations are Documented

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Slide 4

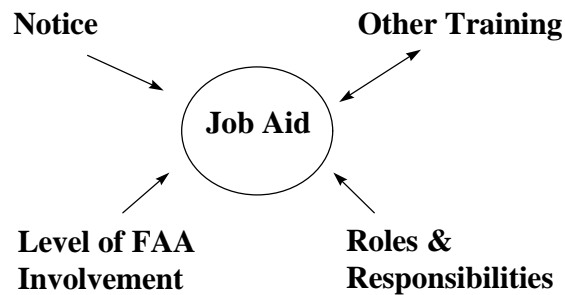
Course Overview

- Background Information & Job Aid Layout
- Section I - Introduction
- Section II - Overview of the Review Process
- Section III - Getting Started
- Section IV & V - Review Tasks/Activities/ Questions
- Desk-top Review Considerations
- Tailoring the Job Aid
- Summary

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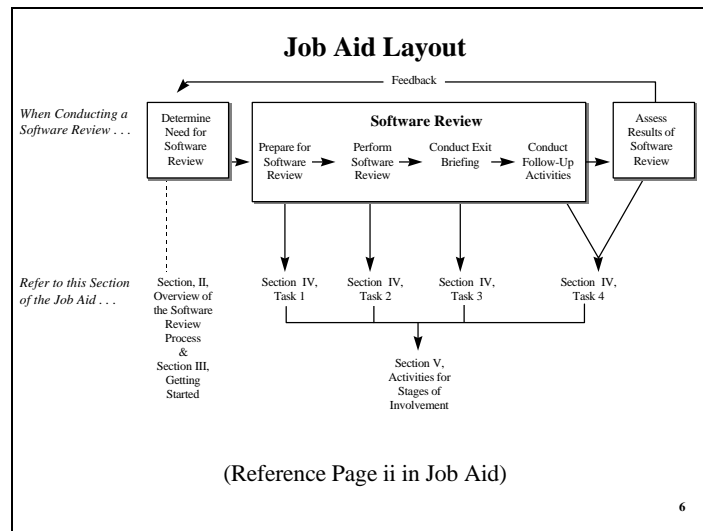
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Background Information




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Slide 6



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Section I - Introduction



- Purpose of the Job Aid
- Some Considerations
- Stakeholders

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Purpose of the Job Aid

- Standardize the Software Review Approach
- Provide a Tool for Engineers and Inspectors to Perform the Software Review (as a team)
- Improve the Quality of Software Reviews
- Inform Applicants of the FAA's Approach

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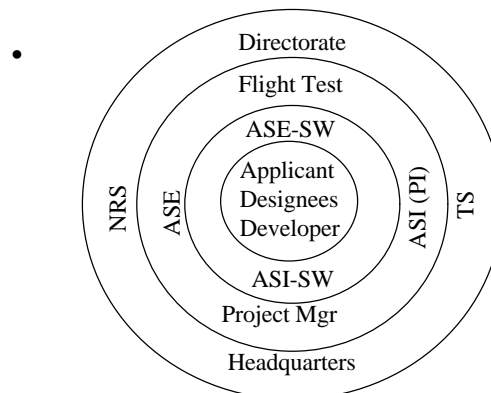
Some Considerations When Using the Job Aid

- Do Not Use as a “Checklist”
- Use with DO-178B
- Tailor as Needed
- Use for TC/STC/ATC and TSOA Projects
- Provide Feedback for Future Updates

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Stakeholders



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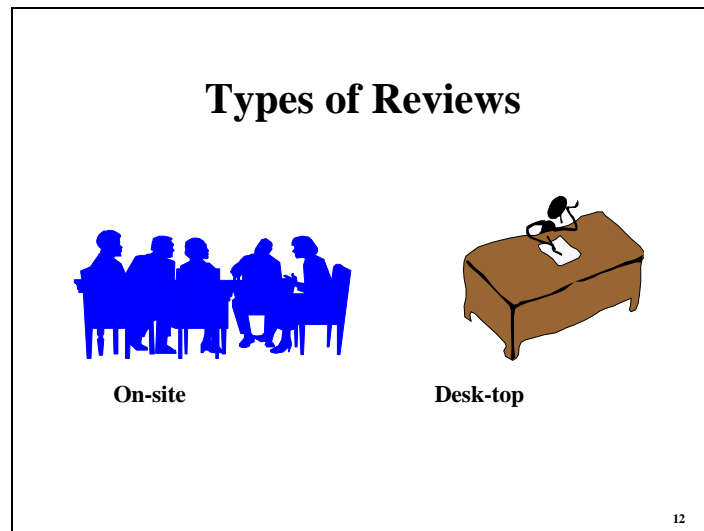
Section II - Overview of the Review Process



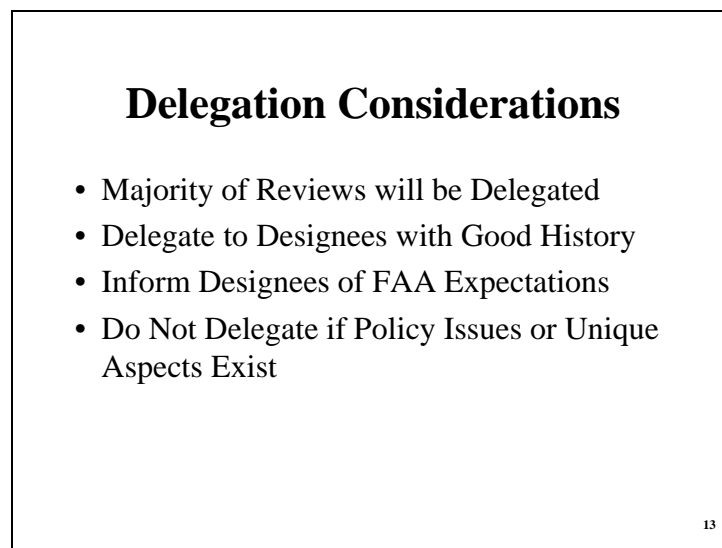
- Types of Reviews
- Delegation Considerations
- Four Stages of Involvement

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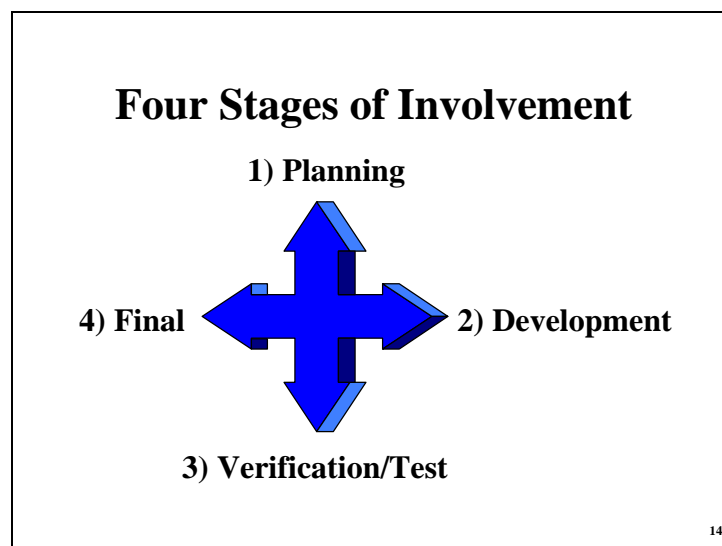
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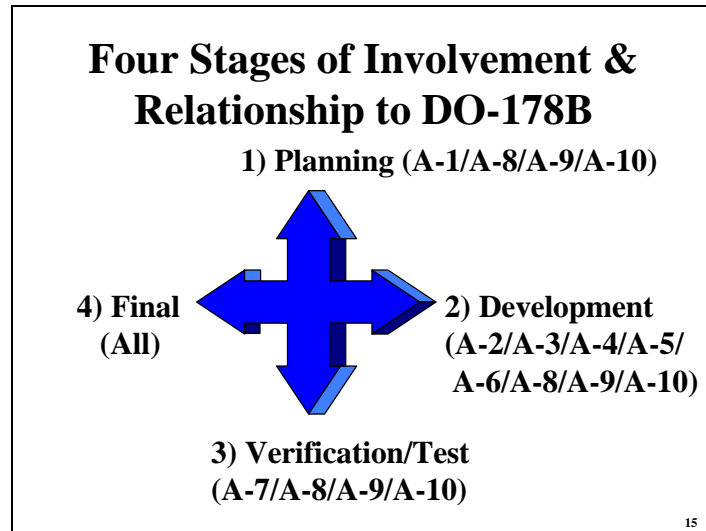
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Section III - Getting Started



- Determine Level of FAA Involvement
- Overview of Common Tasks
- Teaming of ASEs and ASIs

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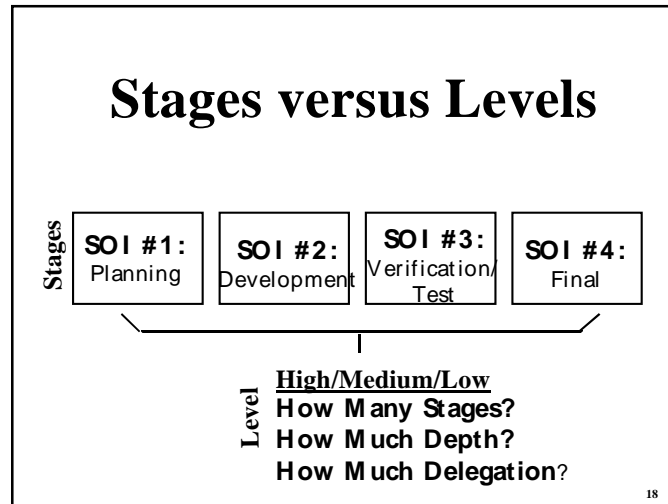
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Determine Level of FAA Involvement

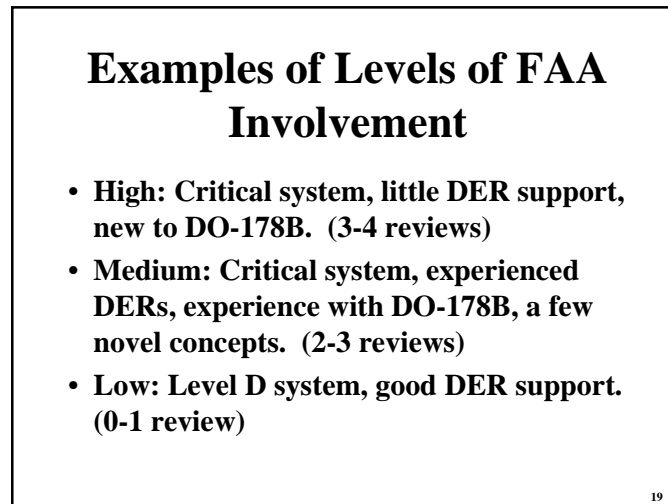
- Determine Early in the Project
- Determine When and How Many Stages the FAA will Be Involved In (i.e., How Many Reviews)
- Reference Notice
- Document the Anticipated Level of Involvement

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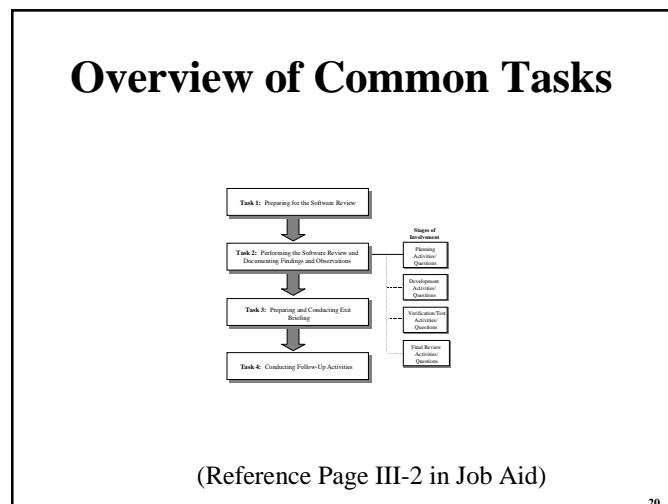
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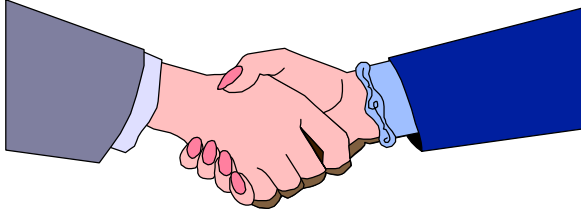


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Teaming of ASEs and ASIs

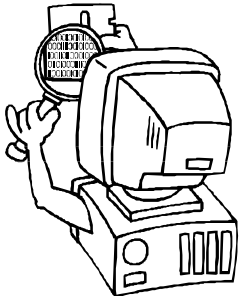


Working Together In the Software Review Process

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Sections IV & V - Review Tasks, Activities, & Questions

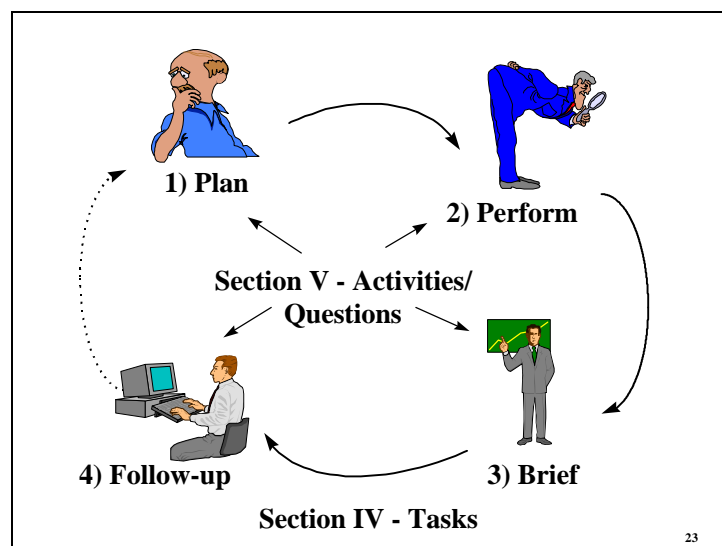


Overview of Tasks

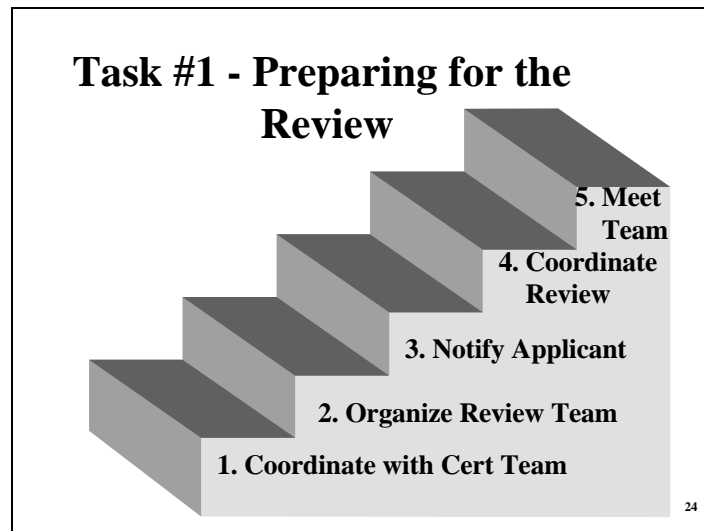
- 1) Preparing for Review
- 2) Performing the Review
- 3) Preparing & Conducting Exit Brief
- 4) Conducting Follow-Up Activities

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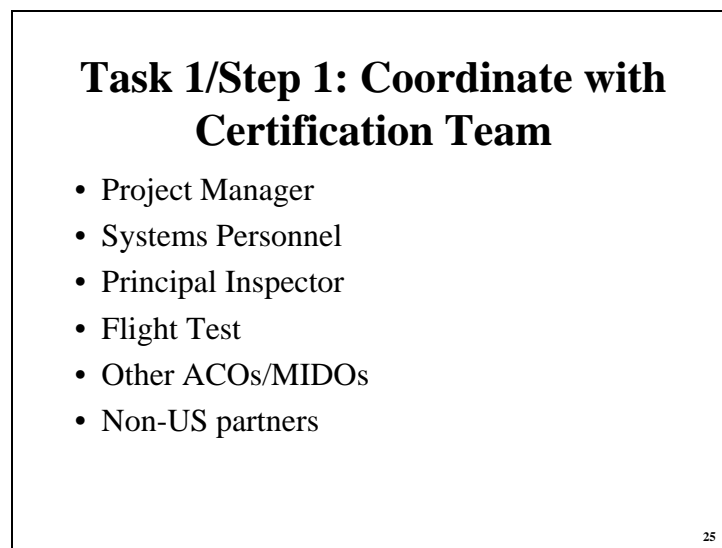
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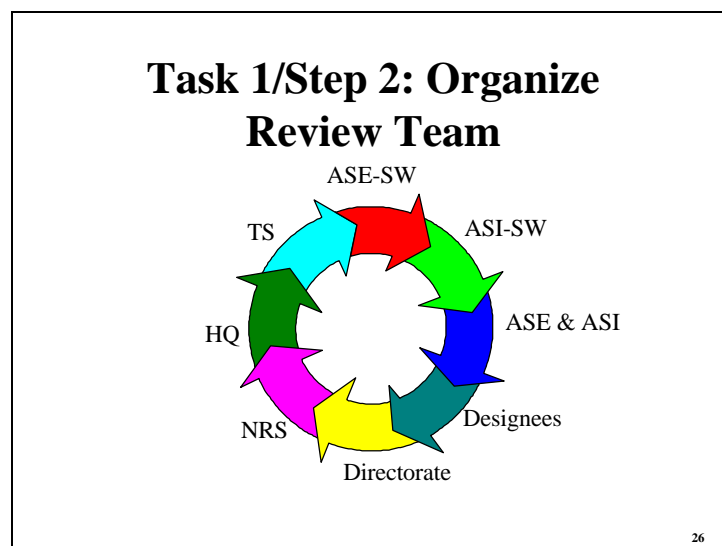
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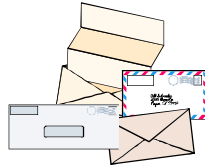


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Task 1/Step 3: Notify Applicant



- Notification Letter
 - Specify Date of the Review
 - Provide Agenda
 - Specify Required Data
 - Specify Stage of Involvement & DO-178B Objectives to be Assessed
- Sample Letter & Agenda - Appendix A

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Task 1/Step 4: Coordinate Review

- Send Data to Team Members
- Assign Responsibilities to Team Members
- Use Section V to Prepare for the Review
- Request Team Members to Prepare Questions Based on Review of Documents, Prior to Review

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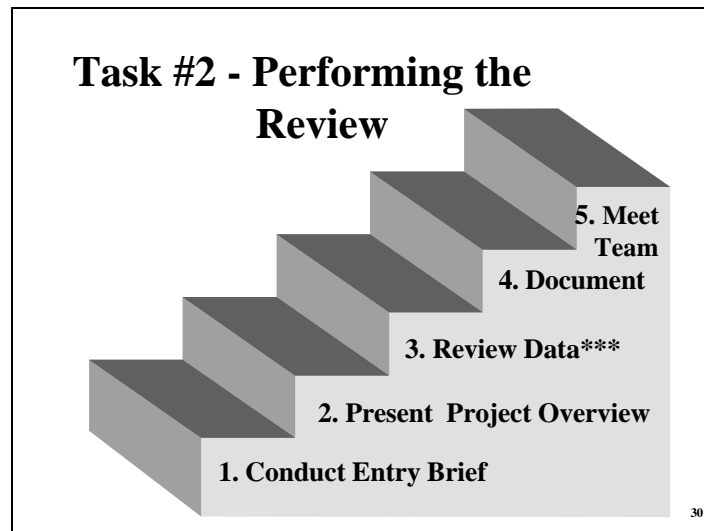
Task 1/Step 5: Meet With Review Team

- Meet with Review Team Members
- Discuss Concerns
- Discuss Approach
- Discuss Responsibilities



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Task 2/Step 1: Conduct Entry Brief

- Introduce the FAA Review Team
- Meet the Applicant's Team
- Explain Plans, Agenda, Expectations
- Encourage Cooperation

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Task 2/Step 2: Applicant Presents Project Overview (1/2)

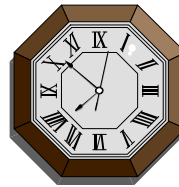
- Become Familiar with the Project
- Become Familiar with the Company's Organizational Structure
- Strive to Understand the "Big Picture" of the Project
- Strive to Understand the Software, Systems, and Safety Links

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Task 2/Step 2: Applicant Presents Project Overview (2/2)

- Strive to Understand the CM, QA, and Development Processes
- Ask Questions
- Keep on Schedule

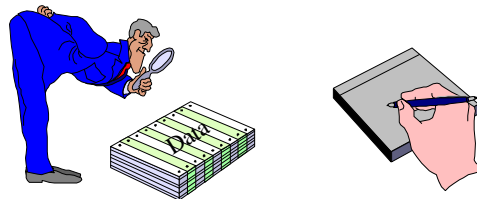


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Task 2/Steps 3 & 4: Review and Document

- Perform Steps Simultaneously
- Use Section V Activities and Questions Appropriate to the Stage of Involvement



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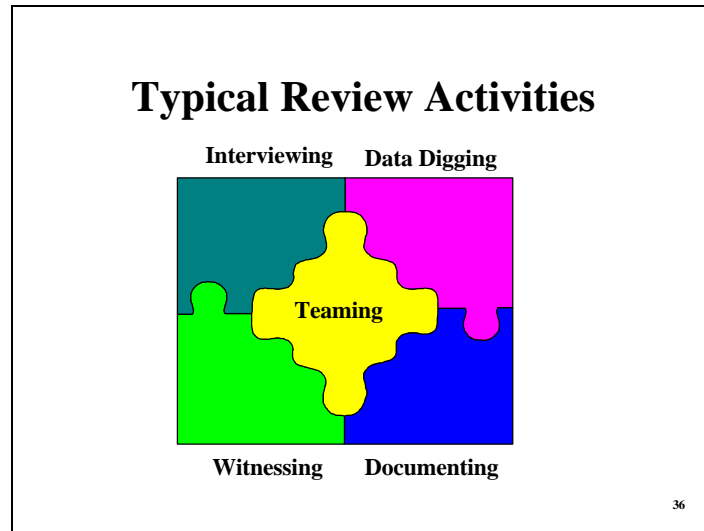
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Items Needed for the Review

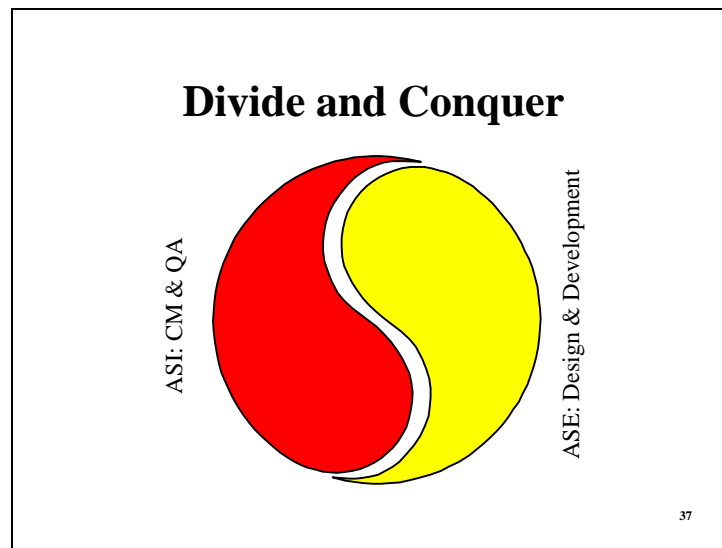
- Notebook or Computer for Documentation
- Colored Sticky Tabs
- Job Aid Section V Activities/Questions Tables
- DO-178B
- Applicant/Developer's Documentation
- Appropriate Applicant/Developer Personnel

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Example Situation

- Applicant is Finishing Coding & Starting Testing (i.e., SOI #2)
- ASI/ASE Use Section V Activities & Questions for SOI #2
- ASI/ASE Use DO-178B
- ASE Performs Activity 2.1
- ASI Performs Activity 2.9

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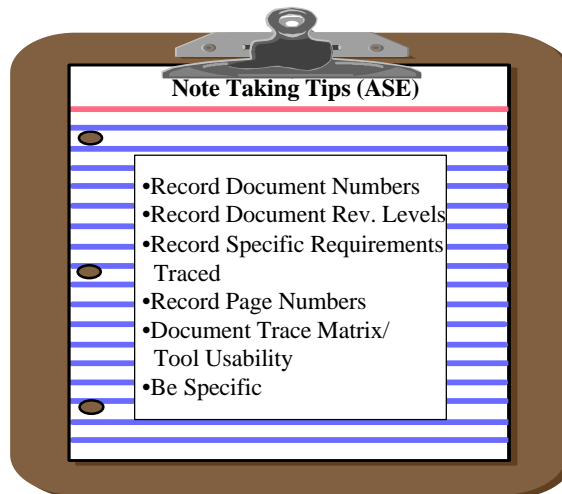
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Example of ASE Activity

- ASE Performs Trace(s) to Assess 2.1
- Uses Trace Matrix/Tool
- Strives to Understand the Data and How it Fits Together
- Asks Questions of Developers
- Uses Sticky Tabs to Mark Places
- Uses Job Aid Section V as a Guide (√/√*)
- Keeps Notes

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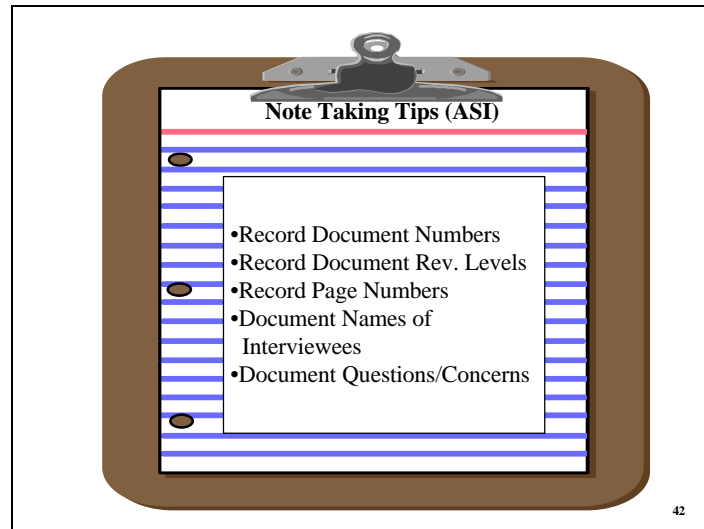
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Example of ASI Activity

- ASI Looks at QA Data to Assess 2.9
- Reviews QA Plans
- Interviews QA Personnel
- Looks at QA Records
- Questions Review Team Members
- Uses Job Aid Section V as a Guide (√/√*)
- Keeps Notes

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Review Tips

- Communicate with Team Members
- Work Efficiently
- Be Considerate and Cooperative
- Be Flexible
- Allow the Data to Speak for Itself

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Task 2/Step 5: Conduct “End of Day” Team Meeting

- Meet with Review Team
- Discuss Findings/Observations
- Record and Summarize Results
- Prepare for Next Day’s Activities
- Begin “Summary of Compliance Findings/Observations” Tables, if time permits

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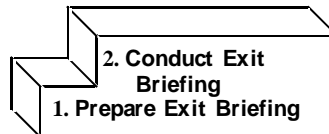
After “End of Day” Meeting

- **Inform Applicant of Next Day’s Plans**
- **Repeat Task 2/Steps #3 - #5, as required**

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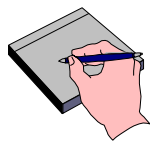
Task #3 - Preparing & Conducting Exit Briefing



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Task 3/Step 1: Prepare Exit Briefing



- **Meet with Team Members**
- **Determine Who Will Deliver Exit Briefing**
- **Determine Points to be Presented**
- **Prepare a Summary of Certification Issues**
- **Organize the Exit Briefing**

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Task 3/Step 2: Conduct Exit Briefing

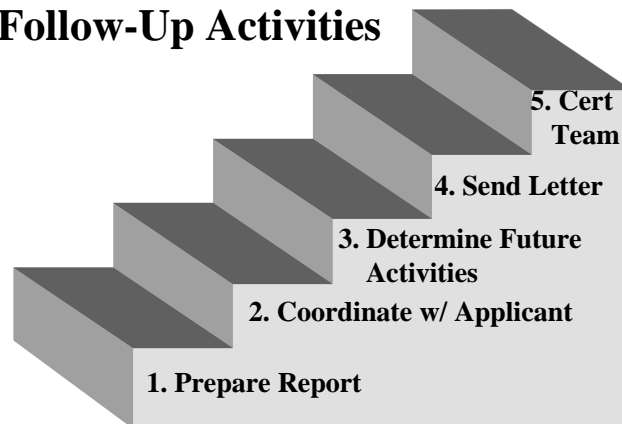


- Thank the Applicant/Developer
- Present Findings/Observations
- Summarize Certification Issues
- Summarize Future Actions Required
- Inform Applicant of Report and FAA's Expectations

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Task #4 - Conducting Follow-Up Activities



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Task 4/Step 1: Prepare Report

- Summarize Review Process and Notes
- Report Findings/Observations
- Map Findings Observations to DO-178B Objectives, Using Summary of Compliance Findings/Objectives tables
- Report Clearly and Concisely
- Coordinate Report with Review Team
- Complete as Soon as Possible

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Task 4/Step 2: Coordinate Preliminary Findings with Applicant

- Provide a Preliminary Copy of Report to the Applicant
- Discuss the Report with the Applicant
- Resolve Discrepancies and Errors in the Report

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Task 4/Steps 3-5

- **Step 3:** Determine Future Activities
 - More Reviews?
 - Delegation?
 - Resubmission of Data?
- **Step 4:** Submit Final Report
 - Submit Report with a Transmittal Letter Summarizing Required Actions
- **Step 5:** Coordinate with Cert Team

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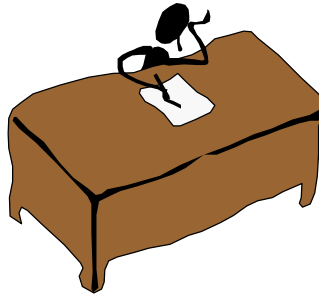
Desk-top Review Considerations

- Job Aid Focused on On-Site Reviews
- “Special Considerations” for Desk-top Review Following Each Task
- Examples of “Special Considerations”:
 - Notification Different
 - Request More Data
 - Can’t Interview Personnel as Easily
 - Exit Briefing may be via Telecon

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Desk-top Reviews can Provide High Quality Assessment



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Tailoring the Job Aid (1/2)



- Prior to Review, Evaluate Activities/ Questions
- Delegate Activities/ Questions to Designees, as Appropriate
- Add Activities/Questions, as Appropriate
- Delete Activities/Questions, as Appropriate

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Tailoring the Job Aid (2/2)

- During the Review, the Situation May Lead to a Change in Direction
- Job Aid is Designed For Flexibility
- Job Aid is NOT A CHECKLIST



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Summary

Job Aid:

- Is a Tool
- Promotes Teaming
- Allows for Flexibility
- Used for “Prior to Certification” Work
- Should be Shared, along with this Training, with Designees.

Please Forward Comments/Questions Via E-mail.

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IVT Course Exercises

Appendix B

EXERCISE #1

Situation: Assume that you are the engineer or inspector responsible for performing the oversight of company XYZ. XYZ is a new company and is developing a Level A flight control system.

Question: What are some things that you would do early in the project to prepare XYZ and the FAA for up-coming software activities?

List Your Responses:

EXERCISE #2

Situation: Company XYZ has just finished their planning process and informed the FAA that they are ready for their first review.

Questions:

What Stage of Involvement will this be?

What would the team leader do to prepare for the review?

What would the review team members do to prepare for the review?

How would you use the Job Aid to prepare for the review?

EXERCISE #3

Situation: Assume that you have completed a software review at XYZ company for Stage of Involvement #1. At the review you used the Job Aid SOI #1 Tables as a guide and kept notes as shown below. During the review you were pressed for time and were unable to record the DO-178B objectives that correlated to your findings.

Directions: Using the notes below and the Job Aid, fill out the “DO-178B Objective” column. Using the Summary of Compliance Findings/Observations” tables for DO-178B objectives, A-1, A-8, A-9, (attached), complete the “findings” column.

The following Activities/Questions for SOI #1 had “√*”: 1.1.1, 1.1.6, 1.1.5, 1.5.3, 1.6.1, and 1.6.4. The other Activities/Questions for SOI #1 had “√”. When keeping the notes, the reviewer was not able to fill in the DO-178B Objective Column due to time constraints.

The following notes were kept during the review:

Job Aid Ref #	Notes	DO-178B Objective
1.1.1	Plans are not under CM (finding).	
1.1.6	PSAC, page 8, states that they will use coding standard. However, the coding standard is non-existent (finding).	
1.5.1	SCM Plan does not consider Control Category #1 issues from DO-178B Table 7-1 (finding).	
1.5.3	The problem reporting process is not defined in any of the plans (finding).	
1.6.1	SQA plan is weak. It could use additional detail (observation).	
1.6.4	Transition criteria is not specified (finding).	

Anx	Objective	Table A-1 Software Planning: Summary of Compliance Findings/Observations— Level (Date:)	Applicable Level	Job Aid
	Summary (Numbers are DO- 178B section references)	Applicant: Project #:		Ref
	#	System:		
1-1	Software development and integral processes activities are defined. 4.1 a, 4.3		A/B/C/D	1.1, 1.3, 1.4, 1.6, 1.7, 1.8
1-2	Transition criteria, inter-relationships and sequencing among processes are defined. 4.1b, 4.3		A/B/C	1.1, 1.3, 1.4, 1.6, 1.7
1-3	Software life cycle environment is defined. 4.1c		A/B/C	1.1, 1.2, 1.3, 1.4, 1.7
1-4	Additional considerations are addressed. 4.1d		A/B/C/D	1.1, 1.2, 1.3, 1.4, 2.4
1-5	Software development standards are defined. 4.1e		A/B/C	1.1, 1.3, 1.9
1-6	Software plans comply with this document. 4.1f, 4.6		A/B/C	1.1, 1.3
1-7	Software plans are coordinated. 4.1g, 4.6		A/B/C	1.1, 1.3

IVT Course Evaluation

Anx	Objective	Table A-8 Software Configuration Management Process: Summary of Compliance Findings/Observations—Level (Date:)	Applicable Level	Job Aid
	Summary (Numbers are DO- 178B section references)	Applicant: Project #:		Ref
	#	System:		
8-1	Configuration items are identified. 7.2.1		A/B/C/D	1.5, 2.6, 3.4
8-2	Baselines and traceability are established. 7.2.2		A/B/C/D	1.5, 2.6, 3.4
8-3	Problem reporting, change control, change review, and configuration status accounting are established. 7.2.3, 7.2.4, 7.2.5, 7.2.6		A/B/C/D	1.5, 2.4, 2.7, 3.5
8-4	Archive, retrieval, and release are established. 7.2.7		A/B/C/D	1.5, 2.8, 3.6
8-5	Software load control is established. 7.2.8		A/B/C/D	1.5, 3.8
8-6	Software life cycle environment control is established. 7.2.9		A/B/C/D	1.5, 3.2

Anx	Objective	Table A-9 Software Quality Assurance Process: Summary of Compliance Findings/Observations—Level (Date:)	Applicable Level	Job Aid
	Summary (Numbers are DO- 178B section references)	Applicant: Project #:		Ref
	#	System:		
9-1	Assurance is obtained that software development and integral processes comply with approved software plans and standards. 8.1a		A/B/C/D	1.6, 2.1, 2.2, 2.9, 3.7
9-2	Assurance is obtained that transition criteria for the software life cycle processes are satisfied. 8.1b		A/B	1.6, 2.9, 3.2
9-3	Software conformity review is conducted. 8.1c, 8.3		A/B/C/D	2.9

IVT Course Evaluation Form

Appendix C

IVT Course Evaluation

Please give us your candid opinions concerning the training you've just completed. Your evaluation of the IVT course is important to us and will help us provide the best possible products and service to you.

Course title: **Using the Software Job Aid to Conduct Software Reviews**

Date: ***July 1, 1998***

Number of years of FAA experience: _____

(Optional)

Name: _____ Office phone: () _____

For the following, please completely darken the circle appropriate to your response.

	Very Good	Good	Average	Poor	Very Poor	N/A
1. Length of course	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
2. Depth of information	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
3. Pace of training	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
4. Clarity of objects	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
5. Sequence of content	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
6. Amount of activities/practice	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
7. Quality of course materials	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
8. Effectiveness of instructor	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
9. Overall quality of the course	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
10. Overall effectiveness of the IVT forms	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>

11. Rate your knowledge of the topic before and after taking this IVT course.

IVT Course Evaluation

	Very Low	Low	Moderate	High	Very High
<i>Before the Course:</i>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
<i>After the Course:</i>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>

12. What did you like best about the course?

13. What would you improve in the course?

14. What previous experience, if any, have you had with IVT courses?

☐ None ☐ Moderate ☐ Considerable

15. Were you comfortable with the IVT format? ☐ Yes ☐ No ☐ Undecided
If not, why not?

16. Would you like to take other IVT courses? ☐ Yes ☐ No ☐ Undecided
If not, why not?

17. Additional comments:

*Please fax this completed form to Leanna Rierson
at 202-267-5340. Thank you.*